

Standardization perspectives applicable in the field of artificial intelligence

N. M. Kuprikov^{*}, *M. Yu. Kuprikov*¹, and *E. A. Kozhukhova*¹

¹Moscow Aviation Institute (National Research University), 4, Volokolamskoe Shosse, Moscow, 125993, Russian Federation

Abstract. This paper presents a study of the current state of standardisation opportunities in the field of Artificial Intelligence looking forward to 2030. As an example of the artificial intelligence technologies use for development purposes, the team of authors considered general education activities. The study analysed and established the potential risks of using AI technologies in educational activities and cited factors which, according to the authors, could constrain the development of the AI field. The characteristics of GOST 59895-2021, GOST 59900-2021 and GOST R 59899-2021, which came into force in 20022, are given. As a conclusion to the paper, practical recommendations on the application of new GOSTs in the field are given. The mentioned GOSTs in perspective should allow removing restrictions on the use of AI technologies in education, overcoming the difficulties of assessing the applied effect of the use of artificial intelligence systems.

1 Introduction

The Russian President's Address to the Federal Assembly in March 2018 pointed to the need for a transition to innovative, relevant for modern society individual learning technologies, to mobile perception of change and creative exploration, constructive teamwork and mastering the skills of the digital world. The Russian President's Decree of May 2018 defined the directions of education development: increasing competitiveness and achieving the level of the top 10 countries of the world in terms of the quality of general education, raising a harmoniously developed and socially responsible personality.

Presidential instruction in January 2019 set deadlines for approbation, implementation and evaluation of individual learning trajectories on a digital platform for personalised learning.

There are many opinions, concepts and approaches regarding the use of artificial intelligence systems in the educational process. For example, the UNESCO Institute for Information Technologies in Education defines the prospects of using artificial intelligence as follows: "Artificial intelligence will play a key role in implementing the idea of personalized learning - adapting learning, its content and pace to the specific needs of each student. Artificial Intelligence provides the ability to capture data from a variety of sources,

* Corresponding author: gxtl@mail.ru

validate that data and analyse it using tools such as predictive analytics and machine learning, so the promising potential of Artificial Intelligence in educational technology can be unlocked and its use can play a catalyst for educational transformation for all stakeholders - from individual students to ministries of education".

Artificial Intelligence is an electronic platform with fully automated management, operation and control while minimising human resources [1-2].

2 Applying artificial intelligence

An example of the use of artificial intelligence technologies for the development and self-development of a professional is the creation and application of the project 'University 2035' [3]. This electronic platform with automated functioning makes it possible to carry out input diagnostics of personal qualities and assessment of competences, creation of individual trajectories with recommendations on available online courses, books, articles to study and achieve the goal set by the teacher. When the learning objective has been achieved, the final generation of a digital footprint and a digital competence profile with the possibility of exporting to the specified servers is generated [4].

Various kinds of risks can arise in the use of artificial intelligence technologies (Table 1).

Table 1. Potential risks of using AI technologies in educational activities.

Type of risk	The nature of risk	Direction of impact
Cognitive bias	The direct attitude of a person who transfers his or her emotions to the object of his or her activity.	Influences the objective presentation of information necessary for the educational process, without any distortions arising from the author's preferences.
Digital divide	"The gap between individuals, households, organisations and geographical areas of different socio-economic status in terms of their ability to access and use information and communication technologies on the Internet for a variety of purposes".	Has a decisive impact on the initial availability to users of any artificial intelligence technology.
Authorship and fakes	Intentional/unintentional exploitation of someone else's copyrighted product, the generation by such a product of information that is not authentic.	Leads to partial misrepresentation or inaccurate information conveyed by artificial intelligence technologies.
Transparency and accountability	Transparency in the use of artificial intelligence technologies - traceability of the results of these technologies, their explainability; accountability - ability to audit and report on negative impact, minimise the latter, compensate for damage.	Such constraints control the extent to which AI technology is incorporated into education, but limit the possibilities for educational technology.

In addition to the risks, the use of artificial intelligence technologies seems to have some positive aspects. These include: the possibility of receiving education at any time; the availability of a 'virtual tutor'; the adaptation of the educational platform to the needs of the learner [5-8].

Oxford Insights and the International Centre for Research and Development have published an index of various countries' readiness for artificial intelligence technologies.

The experts evaluated on the basis of such criteria as: quality of governance; innovation potential; human capital; infrastructure; data availability; representativeness of data; quality of accountability; "transparency", etc. Russia is ranked 33rd on this list [9].

From an economic point of view, standardisation acts as a mechanism for reconciling the interests of different stakeholders, securing best practices and complementing imperative government regulation [10].

In 2020, a Prospective Standardisation Programme for the priority area "Artificial Intelligence" for the period 2021-2024 was adopted". The programme is designed to overcome existing regulatory and technical obstacles in the implementation of the federal project "Artificial Intelligence" in Russia. According to this Programme, standards governing the safety of artificial intelligence systems for humans are to be created in 2021-2024. It was assumed that the standardisation of the implementation of artificial intelligence should affect such areas as transport, medicine, education, construction and others [11].

3 Deterrent factors

A number of factors can be identified that constrain the application of AI technologies, particularly in education, primarily determined by the regulatory and technical difficulties in implementing these technologies (Table 2).

Table 2. Factors limiting the application of artificial intelligence technologies.

Factors	Reasons	Consequences of the factor
mistrust of artificial intelligence technology	Lack of performance guarantees, lack of transparency in decision-making	restrictions on the use of artificial intelligence technologies in the implementation of important tasks
metrological problems	Lack of standard algorithms for comparing the capabilities of different AI technologies with each other and with those of a trained professional	difficulties in assessing the practical effects of using artificial intelligence technologies
interoperability challenges	Lack of standard data presentation formats, training and control sampling requirements	difficulties in assessing the practical effects of using artificial intelligence technologies

The factors mentioned in Table 2 can be overcome through the development and implementation of standards for educational technologies with elements of artificial intelligence. Such standards, as well as other standards, can be of different types: international, national, territorial (developed by RF subjects on the basis of specification of national standards), local (adopted by educational organization) [12].

As a result of the implementation of this promising program, GOST 59895-2021 [13] "Artificial Intelligence Technologies in Education. General Provisions", GOST 59900-2021 [14] "Artificial Intelligence Systems. Typical requirements for control samples of raw data for testing artificial intelligence systems in education", GOST R 59899-2021 [15] "Educational products with artificial intelligence algorithms for adaptive learning in general education". These three standards lay the foundation for the process of standardization of artificial intelligence technology application in the field of education.

GOST 59895-2021 "Artificial Intelligence Technologies in Education. General provisions" defines 3 types of terms:

- relating to artificial intelligence;
- relating to the educational process;
- related to the use of artificial intelligence technologies in education.

GOST 59895-2021 can be considered as the basis for the standardisation process in the field of application of artificial intelligence in the educational process.

GOST 59900-2021 "Artificial Intelligence Systems. Typical requirements for control samples of initial data for testing artificial intelligence systems in education" is used and such terms as: educational product with artificial intelligence algorithms, hyperparameters (in machine learning), training sample, validation sample, control sample, metrics (in machine learning) are defined [16].

According to GOST 59900-2021 the requirements for control samples of raw data include: representativeness, the inadmissibility of control samples as validation samples; the need to ensure that the data of the control sample correspond to actual objects; the need to set for the control sample a maximum number of uses to prevent artificial intelligence systems from adjusting to the passage of a particular control sample [17].

In doing so, control samples should be characterised by a set of metadata that can be divided into 3 categories (Table 3).

Table 3. Metadata categories in control samples.

Metadata category	Feature
descriptive	describes the content and status of the data
technical	describes the technical features of data storage and processing
operational	describes the processes for processing and accessing data

GOST R 59899-2021 "Educational products with artificial intelligence algorithms for adaptive learning in general education" defines such terms as: adaptive learning; individual learning trajectory; information and education environment; digital footprint (in education).

According to GOST R 59899-2021, educational products should contain such subsystems as "Authorisation and authentication"; "Adaptive learning"; "Learner's personal account"; "Teacher's personal account"; "Data analysis module"; "Educational content catalogue". This standard also specifies the requirements for each of these subsystems [18-39].

4 Conclusion

Standards in the field of artificial intelligence, which will come into force on 1 March 2022, should make it possible to remove barriers related to its application in the field of education. Works on development of standardization in the field of artificial intelligence will be carried out by technical committee TC 164 "Artificial Intelligence" according to National strategy of development of artificial intelligence for the period till 2030 which assumes formation of systems of standardization and conformity assessment of technological solutions developed on the basis of artificial intelligence, development of international cooperation concerning standardization and provision of possibility of certification of products created on the basis of artificial and The given by us characteristics of GOST 59895-2021 "Artificial Intelligence Technologies in Education. General provisions" as a standard, where the object of standardization is the artificial intellect, allows to conclude that the basis for ensuring compliance of Artificial Intelligence systems of the Russian Federation with international requirements is created. The specified GOST in the long term should help to remove restrictions on the use of AI technologies in education, to overcome difficulties in assessing the applied effect from the use of artificial intelligence systems.

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